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THE WHITE HOUSE

WASHINGTON

November 26, 1982

Executive Registry
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MEMORANDUM FOR MEMBERS, SENIOR INTERAGENCY GROUP FOR SPACE

SUBJECT: SIG(Space) Meeting

The SIG(Space) will convene on December 3, 1982, at 3:00 p.m. in Room 305 of the Old Executive Office Building. The purpose of the meeting will be to formulate a recommendation to the President on the Fifth Orbiter issue. We will also review the status of activities on the Remote Sensing Issue.

An issue paper on the Fifth Orbiter will be forwarded early next week in order to prepare you for the meeting.

Please provide Gilbert D. Rye (395-5022) with the name of your representative at the meeting not later than December 1, 1982.

Robert C. McFarlane
Deputy Assistant to the President
for National Security Affairs

Attachment
Distribution List

NSC review completed.

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Attachment 2

Attachment 2

Space Launch Policy Working Group -

Issue Paper on FY 1984 Budget Issues

SENIOR INTERAGENCY GROUP (SPACE)
SPACE LAUNCH POLICY WORKING GROUP

ISSUE PAPER
ON
FY84 BUDGET ISSUES

ISSUE: Should Orbiter production capability, in the form of the initiation of a fifth Orbiter, be supported in the FY84 budget?

BACKGROUND:

By 1969, NASA had adopted a program plan to develop a manned Space Transportation System (STS) based largely on reuseable components; this system was conceived to provide cost-effective, routine, manned access to space. Economics and politics, as well as technology, were all critical factors in the decision process that led to President Nixon's approval of the STS development in 1972.

As a part of this decision, all Expendable Launch Vehicles (ELV's), with the exceptions of the Scout and Saturn V vehicles, were to be phased out. The cost effectiveness of the STS was predicated on maximum utilization of the Shuttle over its operational life.

The question of the number of Orbiters required for an effective STS fleet was the subject of intense scrutiny by NASA, Congress, and various Administrations for most of the 1970's. Original planning envisioned a five Orbiter fleet. The estimates of STS demand and the numbers of Orbiters to fulfill a given demand have fluctuated continuously throughout the program. These fluctuations have lead to a series of reviews of the question of fleet size.

In preparation for the FY 1977 budget, the Office of Management and Budget (OMB) undertook a review of the STS mission model and studied how many Orbiters beyond the first two were needed. To support the OMB review, NASA and the DOD jointly reviewed the requirements for Orbiters and issued a position statement that five Orbiters were essential to meet National requirements. Following the OMB review, the Administration did decide that five Orbiters were essential to the Space Transportation System.

In 1977, under the Carter Administration, the question of the number of Orbiters was studied again by OMB. The resulting Administration's position was that only funding for a four-Orbiter fleet would be requested by NASA. During subsequent consideration of the fifth Orbiter question in 1978, the Congress decided that (1) a five Orbiter fleet was an option which should be kept open, and that (2) interrupting production of Orbiters between the fourth and fifth Orbiter would have cost penalties. In February 1980, NASA testified before Congress that, due to slips in all parts of the STS program, a delay in fifth Orbiter funding until FY 1982 would probably not cause substantial penalties. As a result of fifth Orbiter funding deletion from subsequent NASA budgets, the production start has become an FY 1984 budget issue.

The STS was conceived, developed and supported to universally service the U.S. military and civil government needs, the U.S. and foreign commercial needs, as well as selected foreign government needs. The commercial and foreign government flights were a critical factor in the economic analysis that showed the STS was a cost effective alternative to our proven and established ELV capability.

This concept was based upon U.S. policy of providing launching services to commercial and foreign entities in keeping with:

The National Aeronautics and Space Act - which provides NASA the authority to provide such services,

The COMSAT Act which requires NASA to provide such services to COMSAT upon request, and

The President's Launch Assistance Policy of 1972 - which states that the U.S. would provide, on a non-discriminatory, cooperative or reimbursable basis, satellite launch assistance to other countries or international organizations.

The current policies, National Space Policy (NSDD-42) and Space Assistance and Cooperation Policy (USDD-50) reaffirm these previous policies. The National Space Policy directs that the STS will be the primary U.S. government launch system and that U.S. Government ELV's will be maintained until the capabilities of the STS are sufficient to meet its needs and obligations. Implementation of these policies through the use of existing U.S. Government launch capabilities to serve these customers has generated, to date, approximately $2.4 billion dollars in launch service revenues ($1.0 billion from overseas).

The fourth Orbiter is currently scheduled for December 1984 delivery. Unless a decision is made to continue Orbiter production in FY 84, the production facilities, personnel, subcontractors and vendors will be released.

DISCUSSION:

The sale of STS services to foreign and commercial customers was a critical factor in the economic analysis that concluded that the STS would be cheaper than ELV's for the U.S. Gvernment in the long run. If this principle is violated, the economic viability of the STS as the sole U.S. Government launch system is in question. Abandoning the reimbursable market would constitute an abrupt change in policy and would place the entire burden of STS operations on the U.S. Government. This change, or any commercialization options that result in increased operations cost to the U.S. Government should be avoided.

For this study, conservative STS capability projections were made and compared to the STS manifest over the period FY83-88 to evaluate the adequacy of a four orbiter fleet to meet that demand. Based on four test flights and one operational flight, the projections are subject to a great many uncertainties. Nevertheless, their analysis shows that a four Orbiter fleet only marginally satisfies the manifest. Should an orbiter be lost, a three orbiter fleet cannot satisfy the STS manifest. Many highly probable, but unquantifiable,

factors were considered, but not included, in this comparison. Consequently, operations under the optimistic conditions assumed for this study are highly unlikely; prolonged operations with four orbiters is considered to be high risk until more definitive estimates of capabilities and demand are available.

Permitting the orbiter production capability to lapse at this time introduces additional risk into the program. Accidents or anomalies that require substantial rework of an individual orbiter or all four initial orbiters will certainly be prolonged as venders, sub-contractors, tooling and facilities are reinitiated and requalified. The expense to reopen and requalify selected vendors, subcontractors, and facilities will certainly be large.

DECISION OPTIONS

The NASA FY 84 budget request includes the funding to produce and deliver a fifth Orbiter. The fifth Orbiter funding is an issue in the preparation of the President's FY 84 budget request. This request, in fact, represents decisions of NASA management that production of the fifth Orbiter is the most practical and supportable alternative from available options.

These options can be grouped into four general categories--close out Orbiter production, maintain Orbiter production capability, continuing full Orbiter production, or start a Block II Orbiter definition.

I. Close Out Orbiter Production - This option offers near term budget reductions on the order of $200-300M per year. However, a decision to abandon production capability should be a last resort when the Orbiter is projected to be the longest lead time item and the critical path to STS operations. With only four test flights and one operational flight as the experience base for projections of system turnaround time, availability, reliability, maintainability and attrition, a realistic assessment of flight operations through 90 flights (end of FY 87) is extremely subjective.

   This option also limits the capability to perform major Orbiter repairs/maintenance due to the startup and recertification of people and facilities before work on major structural components could be accomplished. This has potentially serious impacts on repairs or modifications to major assemblies such as wings, mid-bodies, crew module, or vertical stablizers.

   In addition, once a subsequent decision is made to produce additional Orbiters, the startup and recertification time is added to the production time. An Orbiter can currently be delivered in approximately 5 years. Conservatively 6 to 7 years would be required once the production base is abandoned. Startup and recertification costs would be added to the costs of identifying and establishing numerous vendors and sub-contractors.

II. Maintain Orbiter Production Capability - Two major approaches are available under this option:

A. Sustain Sub-tier Production Capabilities/Subsystem Deliverables

This approach would maintain the qualified Orbiter vendors and sub-tier subcontractors and effectively sustain the capability to product critical components and subsystems. It would not maintain major subcontractors or prime production capability, i.e., major structural assemblies.

B. Sustain All Production Capability/Major Assembly Deliverables

This option would maintain the critical vendors, sub-tier and prime subcontractors, as well as the prime contractors' production capabilities. The product of this effort would be the delivery of major system assemblies as modular spares, i.e., wings, mid-bodies, crew module, etc. An additional advantage of this option is the continuity of the generic production base required to respond to major repairs or structural maintenance requirements. It would not produce an assembled Orbiter.

III. Continue Full Orbiter Production - Two approaches to this option are:

A. Produce a Fifth Orbiter

This option clearly maintains all orbiter production skills and facilities. In addition, this approach also provides the ability to utilize the major assemblies of the fifth Orbiter as modular spares if required; this production capability also provides the ability to respond to major repairs and structural maintenance requirements.

B. Initiate Another Block Buy of Orbiters

This option also maintains the full range of Orbiter production skills and facilities while offering the most robust program. In effect, this option provides for a "full pipeline" of components, subassemblies, as well as major assemblies. This ensures a flexible and responsive repair and maintenance capability. While the block buy concept offers the economic advantage of quantity production, the cost savings do not presently appear to be commensurate with the associated large financial commitments. Selection of this option at this time also requires a commitment to maximum STS capacity before accurate demand and capability assessments can be made.

IV. Initiation of a Block II Orbiter - Without a detailed study, this option is conservatively estimated to require 7 to 9 years from initiation to delivery. This option also does not, of itself, maintain orbiter production capability which would conceivably lapse during the definition and design phase. This option also requires a commitment based on extremely limited operational experience; the ability to accurately define the requirements and improvements of a BLock II design based on this data is questionable. Since little or no serious study has been accomplished on this option, the technical and financial risks are judged to be very high.

CONCLUSIONS:

National Space Policy directs maintaining U.S. world leadership in space transportation. Maintaining world leadership requires continued, rather than periodic, commitments. These commitments require fiscal backing to implement U.S. policies. Without budget commitments, such policy statements are meaningless.

The U.S. cannot abandon its highly successful ELV capability, transition totally to the STS as its only access to space, and abandon the production base for orbiters concurrently and seriously entertain intentions of remaining a world leader in space transportation.

With only five STS flights we do not have adequate data to make reasoned and confident decisions on orbiter fleet size. We need more experience to firmly assess such critical factors as turnaround time, system availability, maintenance, attrition, and demand.

Prudence and sound management demands maintaining all STS production capabilities until we have solid assessments of the critical factors above.

To prematurely constrain ourselves to a four Orbiter fleet in the face of these many uncertainties will only erode confidence in the STS as a viable, dependable approach to space transportation. Foreign nations' perception of the U.S. as an unreliable source of launch services will be reinforced; we must offer them a service that is available and reliable to meet their needs as they, not we, perceive them. Both U.S. and foreign commercial customers will also view the STS as a high risk approach to obtaining a firm launch date. The business community is primarily concerned with schedules; significant launch delays translate rapidly into large economic penalties.

Any perception of the U.S. turning away from its commitment to a fully exploitable STS as we have always stated, will accelerate the transition of foreign and commercial customers from STS planning to other options. The only other launch service options realistically available will be provided by the French, the Soviets, and, potentially, the Japanese.

Turning Western and third world countries as well as commercial customers away from the U.S. is counter to all U.S. policy and interests. The development of the STS was undertaken to meet the "demand" of the entire mission model, including the sale of STS services to commercial and foreign customers. This was a critical factor in

the economic analysis that concluded that the STS would be cheaper to the U.S. Government than the existing expendable systems. If this principle is violated, then the economic viability of the STS as the sole U.S. Government launch system is in doubt. Abandoning, partially or fully, the commercial and foreign market would increase the STS operating burden of the U.S. Government. Any options that result in increased operations costs to the U.S. Government should be avoided.

The STS should be exploited as it was conceived and designed; the system should be aggressively optimized (i.e., make it fully operational and cost effective) and marketed to serve our best interests--be they economic, political, or national security. Only in this way can we offset the financial commitments already made. For the U.S. Government to turn only to its own needs at this time is directly counter to all U.S. interests and will increase the costs to the U.S. Government users.

While a decision at this time to allow the Orbiter production capability to lapse is considered inappropriate because of the many uncertainties precluding definitive analysis, a decision to proceed much beyond a fifth Orbiter commitment is inappropriate for the same reasons.

A balanced, low-risk option should be selected that preserves our basic capabilities, assures maximum insensitivity to errors in projecting system capabilities, as well as demand, and maintain our most flexible options for more careful consideration when firm data is available.

RECOMMENDATIONS:

Based on the conclusions of this study, we recommend continuing the Orbiter production base. FY84 funding should be supported for the production of the fifth Orbiter.

This will productively maintain the production capability and will deliver an orbiter in FY88, if before that time firm data leads to the conclusions that a four Orbiter fleet is adequate, the unassembled components could be used as modular spares (wings, mid-bodies, crew modules, etc.) and none of the investment is wasted.

On the other hand, if we conclude that the demand dictates follow-on Orbiters, the production base is in place to support that decision under the most efficient conditions.

Attachment 3

Attachment 3

IG(Space) Working Group Report on Space Launch Policy

2 December 1982

IG (Space) Working Group Report on Space Launch Policy

INTRODUCTION

The IG-Working Group on Space Launch Policy was tasked to identify issues that had an FY-84 budget impact and provide recommendations to the IG (Space) by November. The only FY-84 budget issue identified was the NASA requirement to fund a fifth orbiter production start in FY-84.

The Working Group constrained its review of this essentially programmatic issue to the policy implications of either starting fifth orbiter production in FY-84 or not. Several reasons for this approach were considered pertinent. First, the composition, background, and talents of the Working Group members were such that detailed programmatic issues could not be independently evaluated. Second, inadequate time was available to visit the operational NASA centers to seek and objectively review technical, production, and financial data. And finally, the charter of the Working Group was felt to be confined to general policy level issues.

Consequently, the approach chosen was to base our review on previously accomplished studies and analyses updated by the most current information available from NASA and their prime contractors. New data or responses to Working Group questions were considered in the context of previous studies and conclusions. No attempt was made by the Working Group to verify or validate the programmatic material presented.

DISCUSSION

An initial review was made by the Working Group to confirm that the orbiter was, in fact, the critical path to STS operations rather than facility throughput or other factors. NASA's data confirmed this to be the case by FY-88 — after the initial system build-up.

Based on this conclusion, we next reviewed the STS capability and flight demand studies as well as the most current NASA data. Based on this information, an optimistic STS launch capability under the most favorable operating conditions was compared to the STS manifest through FY-88. The confidence in even these relatively solid missions requirements becomes lower in the FY 87-88 timeframe; however, enough other considerations existed such as the three year lead time for commercial satellites and the uncertainty in the physical ability to mix the various payloads on a single mission, for the Working Group to conclude that the manifest represented a most conservative (minimal) demand projection and it should be used as the basis for this study.

The Working Group estimated that under best case conditions, an average of 7.5 flights per year, per orbiter, was achievable. This is optimistic for several reasons. As an example, it assumes the turn-around time at Vandenberg to be equal to that at Kennedy. During the period considered, FY 86-88, this is optimistic by essentially a factor of two (i.e., 60 days at Vandenberg vs 28 days at Kennedy).

The need for major inspection and maintenance was recognized and estimated to require five months of down time after every 25 orbiter missions. This effectively reduces the operational flights per year, per orbiter, to 6.6. This estimate was used by the Working Group when comparing capability against the manifest demand.

The evaluation shows that four orbiters can provide 26 flights per year under most favorable conditions. This capability would marginally satisfy the manifest in FY-88 (i.e., 23 flights). The loss of a single orbiter in service, and, in fact, any number of other unfavorable conditions, could preclude satisfying the demand.

Several examples of such unfavorable conditions were identified and the associated impacts estimated in a gross sense:

- Major Configuration Upgrades - Orbiter modifications and upgrades were considered extremely likely; a near-term example is the Centaur modifications required in FY-86 to support the Galileo and International Solar Polar Mission. The effect of these modifications and the critical spacing of the launch windows (i.e., 30 days apart) in reality lowers the effective rate for these two orbiters to four flights each for this specific year.

- Major Anomaly or Failure - While the STS has been extremely successful to date, only five missions, using a single orbiter, have been flown. A major system problem during the FY 83-88 period was considered possible. This would require analysis, possibly additional inspection and testing, and conceivably the grounding of the entire fleet until the issues were resolved. Based on comparisons with US Expendable Launch Vehicles (ELVs) and selected aircraft programs, an estimate of one to six months was judged to be realistic. No means of estimating the frequency of such an occurrence was identified.

- Forced Landing at a Contingency Landing Site - The requirement to land at a contingency site outside the continental United States was also considered a possible occurrence during the FY 83-88 period. Even if no damage to the orbiter was incurred, one to three months could easily be required to return the orbiter to the US and subsequent service.

- Accidents - Accidents were considered to be possible; unfortunately, no means of estimating either the frequency or severity of such accidents could be established. However, all operational experience intuitively indicates the prudence and need to plan for accommodating such problems. The pure statistical probability of losing one orbiter in 183 flights is 0.509 at a reliability of 0.9996.

- Threats - Several evaluations of the system vulnerabilities to hostile acts have been performed. After reviewing these reports, the Working Group concluded that, while the probability of such an occurrence was low, the potential impact on STS operations was high. For instance, if an orbiter were damaged or destroyed, the systems capability would be effectively reduced by 25%.

- Attrition - The present orbiter design specification is for a useful life of 100 operational flights. No firm data exists to determine the validity of

this specification. It may be unattainable or unduly pessimistic; only flight experience will provide the answer.

Such considerations, while judged to be realistic, could not be quantitatively considered by the Working Group when comparing projected capability against the manifest.

A final concern of the Working Group was responsiveness to major repairs or modifcations during a period when the orbiter production capability was not available. The ability to bring tooling out of storage, recertify it and the necessary personnel, acquire materials, fabricate, test, qualify and deliver a major replacement, such as a wing, while not technically in question, poses a serious potential scheduling problem. NASA and contractor estimates to repair/replace a wing are on the order of six months if the production base is in place and 36 months if it is not. Such added delays if the production base is unavailable was considered unacceptable for a critical, high visability, operational program.

CONCLUSIONS

While a comparison of optimistic capability estimates with the relatively conservative manifested demand through FY-88 shows four orbiters to be slightly in excess of that demand, other considerations strongly support the requirement for reserve. Operations under the optimistic conditions assumed for this evaluation are highly unlikely. Prolonged operrations with four orbiters, especially without an on-going orbiter production base, should definitely be considered high risk.

While no single factor at this time drives a conclusion that the fifth orbiter is an absolute requirement, the combination of the many system uncertainties support the conclusion that a fifth orbiter may be required to reliably assure an operational availability of four orbiters.

Clearly the US Government should not abandon its proven ELV capability, as is currently programmed by FY-88, transition totally to the STS as its only access to space, and concurrently terminate the orbiter production. Such actions would be inconsistent with current US space policies and creates a serious risk to all elements of the US space program. In fact, the concept of terminating orbiter production and repair capability is counter to the realities of a continued commitment to the STS as our prime access to space. Attrition alone requires a periodic replacement or orbiters; if the 100 flight per orbiter life estimate is accurate and five years are required to deliver another orbiter, initial production of a replacement orbiter for Columbia would be required around 1990 with three subsequent replacements started over the next three to four years.

Collectively these considerations led the Working Group to conclude that consideration of the need for a fifth orbiter as a point solution is too narrow an issue. The basic issue should be consciously decided in the context of current Presidential policies, rather than as an isolated budget decision.

The programmatic strategy of the most cost-effective program to maintain the production capability is the responsibility of NASA as the STS Program Manager. That issue is considered to be beyond the scope of the charter of the Working Group. However, the option currently proposed by NASA, i.e., the production

Group. However, the option currently proposed by NASA, i.e., the production start of a fifth orbiter in FY-84, satisfies all the concerns and issues posed by the Working Group.

RECOMMENDATIONS

- A responsive and viable orbiter production and repair capability should be maintained.

- NASA, as the STS Program Manager, should continue to be charged with identifying the appropriate programmatic options to efficiently meet this objective.

- All Departments and Agencies with any interest in the STS program should continue to support NASA, as the Program Manager, in its efforts to achieve a fully operational and cost-effective system.

Attachment 4

Attachment 4

Interagency Space Launch Policy Working Group -

Selected Briefing Charts*

* This is an early version of this briefing. The briefing that will be presented at the SIG(Space) meeting has been prepared by NASA and differs considerably from this version.

INTERAGENCY
SPACE LAUNCH POLICY
WORKING GROUP

RECOMMENDATION ON
FY 84 BUDGET ISSUE

INTERAGENCY SPACE LAUNCH POLICY WORKING GROUP

MEMBERSHIP

o CHARLIE GUNN	NASA	COCHAIRMAN
o MAJOR THOMAS MAULTSBY	DOD	COCHAIRMAN
o COL GEORGE OJALEHTO	DEPT. OF STATE	
o JAMES CHAMBERLIN	ACDA	
o [redacted]	DCI	STAT
o LT. COL JAMES HARSHBARGER	JCS	

o OBSERVERS

o BART BORRASCA	OMB
o JAMES LEONG	OSTP

WORKING GROUP BASELINE

- NO NEW STUDIES PERFORMED
  - REVIEWED PREVIOUS STUDIES
  - UPDATES USED WHEN AVAILABLE
- U.S. ELV CAPABILITY EXHAUSTED BY FY87
  - DELTA'S
  - ATLAS CENTAUR'S
  - TITAN'S
- STS IS:
  - CRITICAL NATIONAL RESOURCE
  - ONLY U.S. ACCESS TO SPACE BY FY88
- STS ORBITER PRODUCTION NOW PHASING DOWN
- EXAMINE FY84 BUDGET ISSUES IN THE CONTEXT OF MAJOR POLICY DECISIONS

POLICY BASIS FOR U.S. SPACE ACTIVITIES

- U.S. IS FULLY COMMITTED TO MAINTAINING WORLD LEADERSHIP IN SPACE TRANSPORTATION--NATIONAL SPACE POLICY (NSDD-42, JULY 4, 1982)
- U.S. WILL MAKE THE STS AVAILABLE TO ALL AUTHORIZED USERS--DOMESTIC AND FOREIGN, COMMERCIAL AND GOVERNMENT--NATIONAL SPACE POLICY (NSDD-42, JULY 4, 1982)
- U.S. LAUNCHES WILL BE AVAILABLE TO COUNTRIES, INTERNATIONAL ORGANIZATIONS, OR FOREIGN BUSINESS ENTITIES--SPACE ASSISTANCE AND COOPERATION POLICY (NSDD-50, AUGUST 6, 1982)
- SPACE TRANSPORTATION SYSTEM (STS) IS THE PRIMARY SPACE LAUNCH VEHICLE OF THE U.S. (NSDD-42, JULY 4, 1982)
- STS CAPABILITIES AND CAPACITIES SHALL BE DEVELOPED TO MEET APPROPRIATE NATIONAL NEEDS (NSDD-42, JULY 4, 1982)
- MAJOR CHANGES TO THE STS PROGRAM CAPABILITIES REQUIRE PRESIDENTIAL APPROVAL (NSDD-42, JULY 4, 1982)

EXISTING U.S. POLICY STATEMENTS MANDATE A STRONG AND RESPONSIVE U.S. SPACE LAUNCH CAPABILITY TO BE MADE AVAILABLE WORLDWIDE

INTERAGENCY SPACE LAUNCH POLICY WORKING GROUP

ISSUE

ARE STS CAPABILITIES AND CAPACITIES WITH FOUR ORBITERS SUFFICIENT TO FULFILL NSDD-42 & 50 POLICIES?

INTERAGENCY SPACE LAUNCH POLICY WORKING GROUP

APPROACH

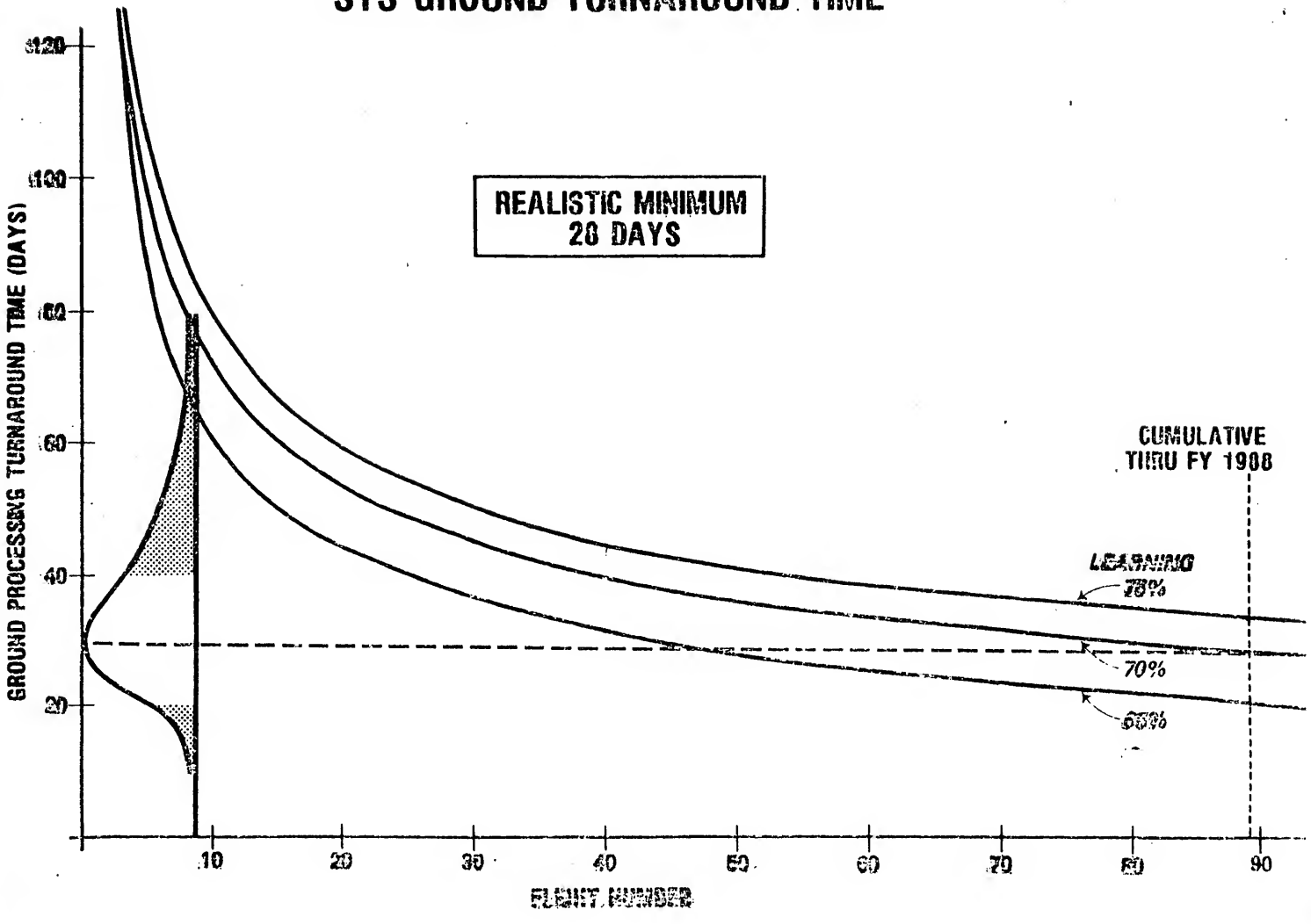
- o STS CAPABILITY
- o STS DEMAND
- o CAPABILITY VS. DEMAND
- o OTHER CONSIDERATION
- o CONCLUSIONS
- o RECOMMENDATION

STS FLEET CAPABILITY

SIS CAPABILITY DETERMINANTS

- FLIGHT-TO-FLIGHT TIME
  - GROUND PROCESSING TIME
  - MISSION DURATION
- MAJOR PERIODIC MAINTENANCE
- CONTINGENCY TIME, FOR
  - OPERATIONAL DELAYS
  - SYSTEM OUTAGES
    - MAJOR CONFIGURATION UPGRADES
    - MAJOR ANOMALY/FAILURE
    - FORCE LANDING
    - ACCIDENTS
    - THREATS

STS GROUND TURNAROUND TIME



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STS MISSION DURATION TIME

- ORBITER CAPABILITY: 30 DAYS ON-ORBIT
- NASA STS MANIFEST (1982-1987): MISSIONS AVERAGE 5.9 DAYS ON-ORBIT
- EXPECT FUTURE MISSIONS TO LENGTHEN IN DURATION
- WORKING GROUP'S ASSESSMENT

AVERAGE MISSION DURATION: 5 DAYS

STS FLIGHT-TO-FLIGHT TIME

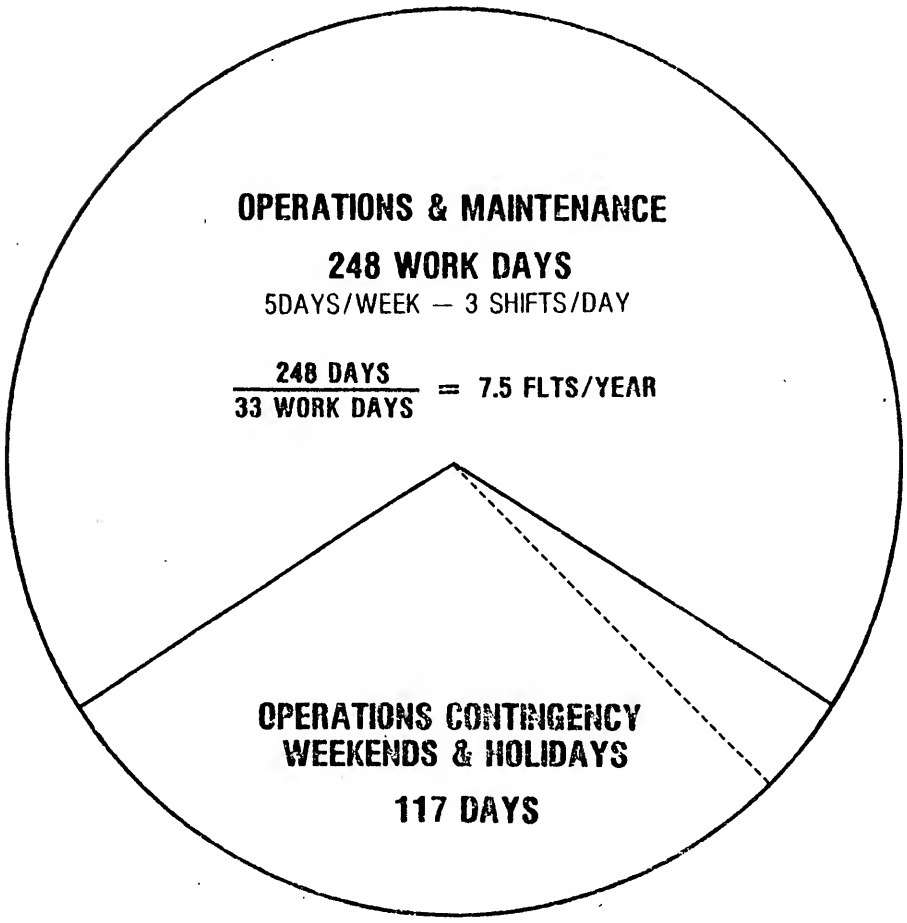
- WORKING GROUP'S ASSESSMENT:
  - GROUND TURNAROUND 28 DAYS

    PLUS
  - MISSION DURATION 5

REALISTIC MINIMUM	33 DAYS

NOTE: TURNAROUND AT KSC AND VAFB ASSUMED EQUAL

STS OPERATIONS



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ESTIMATE OF MAJOR PERIODIC MAINTENANCE DOWNTIME

- EXTRAPOLATION FROM COMMERCIAL AIRLINES DATA
  - AIRCRAFT MAJOR INSPECTION AND OVERHAUL--APPROX EVERY 7 YEARS (25,000 HRS)
  - AIRCRAFT DOWNTIME: APPROX 15 DAYS
  - ORBITER ASSUMPTIONS
    - TWICE AS FREQUENT--EVERY 3½ YEARS (42 MONTHS)
    - TEN TIMES IN DURATION--150 DAYS (5 MONTHS)
- ORIGINAL EQUIPMENT MANUFACTURER'S ESTIMATE
  - 10 MONTHS DOWNTIME AFTER EVERY 25 FLIGHTS
- WORKING GROUP ASSESSMENT

5 MONTHS DOWNTIME AFTER EVERY 25 FLIGHTS

ESTIMATE OF MAJOR PERIODIC MAINTENANCE REQUIREMENTS

- **STRUCTURAL INSPECTION REQUIREMENTS**
  - VISUAL
  - DYE PENETRANT FOR CRACKS
  - X-RAY FOR CORROSION
  - PULL TEST THERMAL PROTECTION TILES FOR BOND STRENGTH
- **AREAS OF CONCERN**
  - STRENGTH
    - **HIGHLY STRESSED/FATIGUE AREAS**
    - **FRACTURE CRITICAL PARTS**
    - **MAJOR MEMBERS AND JOINTS**
    - **EXAMPLES**
      - VERTICAL TAIL (~4MONTHS)
      - WING (~1MONTH)
      - CONTROL SURFACES (~1.5MONTHS)
  - CORROSION
    - **LOW/BLIND AREAS (HORIZ OR VERT)**
    - **EXAMPLES**
      - WING CARRY-THRU (½MONTH)
      - STRUCTURE BEHIND BLANKETS (3MONTHS)
      - BEHIND RCC PANELS (4MONTHS)
  - THERMAL PROTECTION SYSTEM
    - **TILE BOND STRENGTH (4MONTHS)**

BACK-UP

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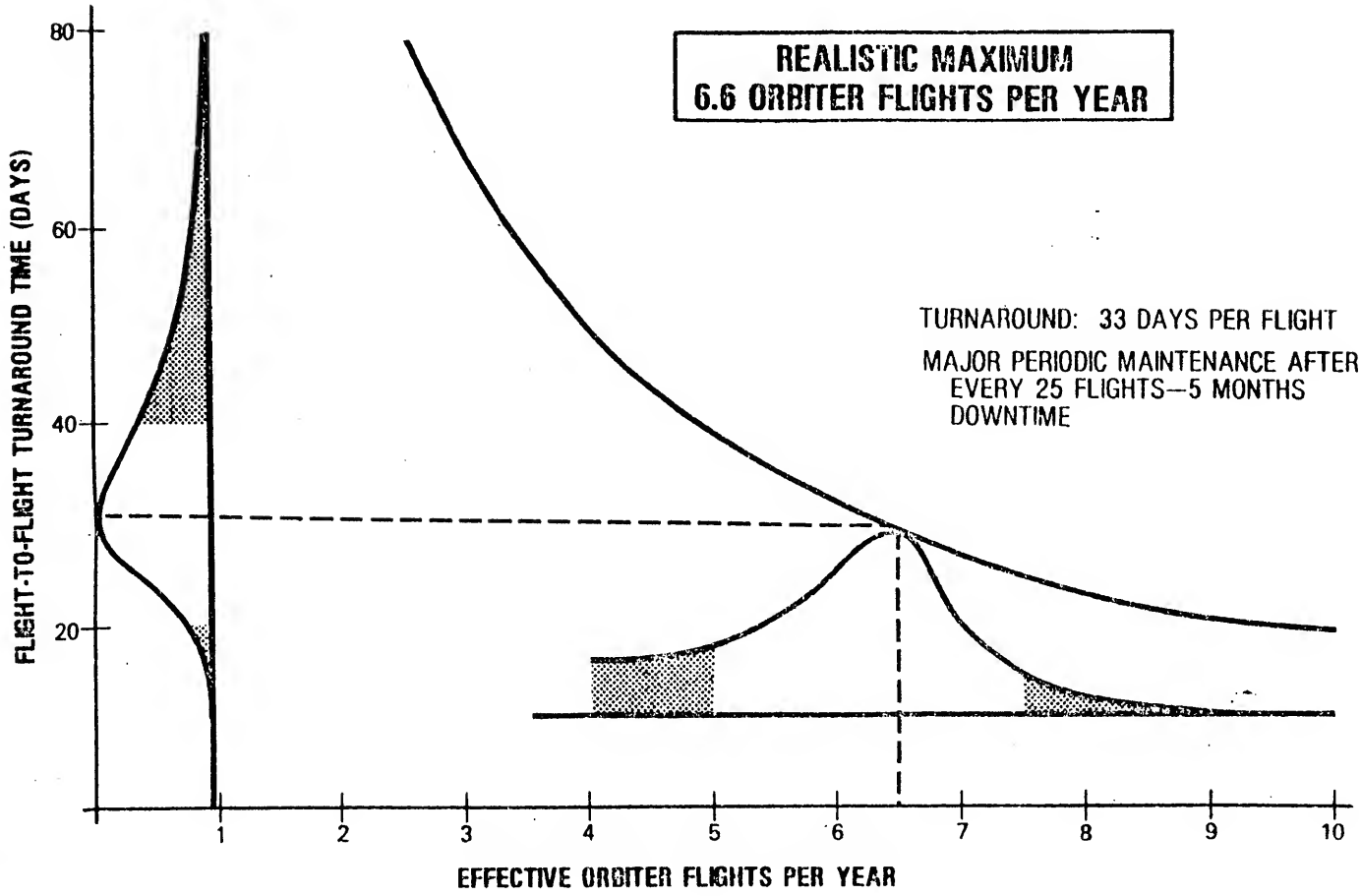
EFFECTIVE ORBITER FLIGHTS PER YEAR

- ORBITER FLIGHT CAPABILITY--7.5 FLIGHTS PER YEAR
- MAJOR PERIODIC MAINTENANCE DOWNTIME
  - 5 MONTHS AFTER EVERY 25 FLIGHTS PER ORBITER
  - $\frac{25 \text{ FLIGHTS}}{7.5 \text{ FLTS/YR}} \times \frac{12 \text{ MONTHS}}{\text{YEAR}} = 40 \text{ MONTHS}$
  - 40 MONTHS OPERATIONS + 5 MONTHS MAJOR PERIODIC MAINTENANCE = 45 MONTHS

$$\frac{25 \text{ FLIGHTS}}{45 \text{ MONTHS}} \times \frac{12 \text{ MONTHS}}{\text{YEAR}} = 6.6 \text{ FLTS/YR}$$

EFFECTIVE ORBITER FLIGHTS PER YEAR = 6.6

EFFECTIVE ORBITER FLIGHT CAPABILITY



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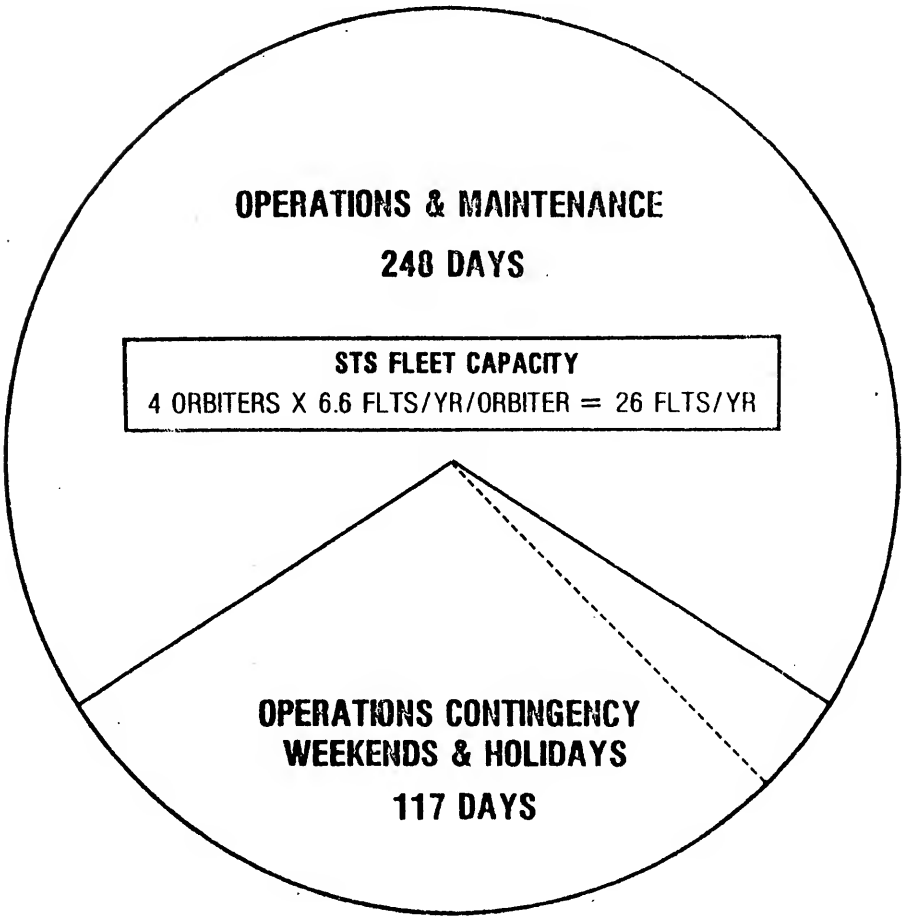
15

STS OPERATIONS



ESTIMATE OF CONTINGENCY REQUIRED FOR OPERATIONS DELAYS

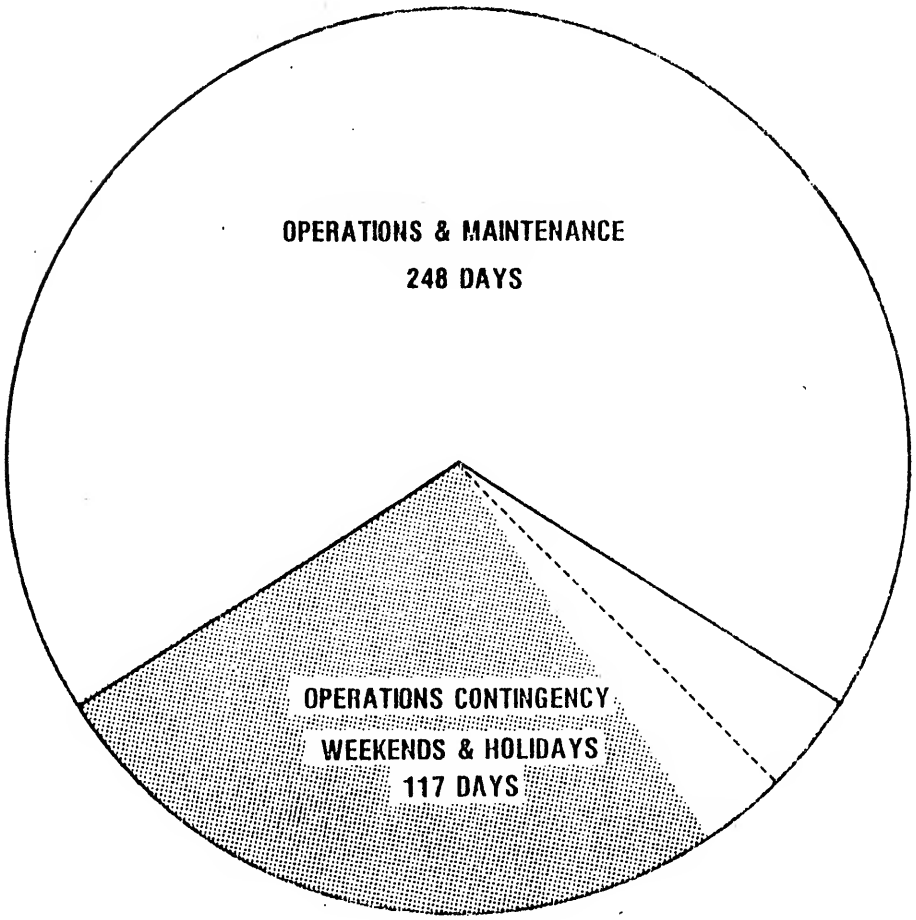
INCIDENT	ESTIMATED DELAY TIME (DAYS)
• **SPACE SHUTTLE VEHICLE PROBLEMS**	1—2
◦ FLIGHT HARDWARE	
◦ LAUNCH PROCESSING SYSTEM	
◦ GROUND SUPPORT EQUIPMENT	
• **PAYLOAD/CARGO PROBLEMS**	1—3
◦ CARGO INTEGRATION TEST EQUIPMENT	
◦ ORBITER INTERFACE	
◦ PAYLOAD OPERATIONS CONTROL CENTER	
• **MISSION SUPPORT**	0—1
◦ MISSION CONTROL CENTER	
◦ RANGE SAFETY	
◦ TDRSS	
• **WEATHER**	1—2
◦ ASCENT	
◦ SOLID ROCKET BOOSTER RECOVERY	
◦ DESCENT/LANDING	
• **UNSCHEDULED DOWNTIME (MINOR)**	1—2
◦ OVERHAUL	
◦ REFURBISHMENT	
◦ INSPECTION	
◦ CONFIGURATION UPGRADES	
• **MISCELLANEOUS**	0—2
◦ PRIORITY MISSION SCHEDULING	
◦ SPARES SHORTAGE/REPAIR	
◦ QUEUE CASCADING	
◦ SHARED ORBITER FERRY	
ROOT-SUM-SQUARED OF DELAYS PER FLIGHT	2-5

o WORKING GROUP'S ASSESSMENT

AVERAGE 3½ DAYS [illegible]AY PER FLIGHT

17

STS OPERATIONS



ASSESSMENT OF STS FLEET CAPABILITY

FOUR ORBITERS X 6.6 FLTS PER YEAR = 26 FLIGHTS PER YEAR

- 28-DAY GROUND TURNAROUND--70% LEARNING/VAFB & KSC EQUAL
- 5-DAY MISSIONS
- MAJOR PERIODIC MAINTENANCE EVERY 25 FLIGHTS PER ORBITER (5 MONTHS DOWNTIME)
- WEEKENDS AND HOLIDAYS ADEQUATE TO ABSORB OPERATIONS DELAYS
- NO CONSIDERATION OF SYSTEMS OUTAGES FOR:
  - -MAJOR CONFIGURATION UPGRADES
  - -MAJOR ANOMALIES/FAILURES
  - -FORCED LANDINGS
  - -ACCIDENTS
  - -THREATS

FACTORS NOT CONSIDERED IN STS FLEET CAPABILITY

INCIDENT	ESTIMATED RECOVERY TIME (MONTHS)
• MAJOR CONFIGURATION UPGRADES	6-8
• MAJOR ANOMALY/FAILURE	1-6 (FLEET GROUNDING)
• FORCED LANDING AT SECONDARY LANDING SITE	1-3
• ACCIDENT	2-6 (LOSS OF ORBITER)
• THREATS	UNKNOWN (LOSS OF ORBITER)

BACK-UP
* - 198

CONTINGENCY RESERVE

EXPERIENCE	RECOVERY TIME — MONTHS
• MAJOR CONFIGURATION UPGRADES	
• MIXED CARGO MOD FOR STS—5	1
• SPACELAB MOD FOR STS—9	6
• STRUCTURAL LOADS MOD	8
• MAJOR ANOMALY/FAILURE	
• DELTA	3—7
• CENTAUR	1—4
• TITAN	1—?
• APOLLO	8—12
• X—15	1
• X—24	1½
• DC—10	½

BACK-UP
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ESTIMATED ACCIDENT RECOVERY TIME

- **HARD LANDINGS**
  - DAMAGE TO LANDING GEAR ONLY (~2MONTHS)
  - DAMAGE TO STRUCTURE (~5MONTHS)
  - DAMAGE TO WING
    (LANDING GEAR COLLAPSE (~6MONTHS)) *
- **DAMAGE TO PAYLOAD BAY DOOR(S) (~2MONTHS)**
- **OVER TEMPERATURES ON FUSELAGE (~3MONTHS)**

** IF NEW WING REQUIRED ~ 36 MONTHS*

BACK-UP
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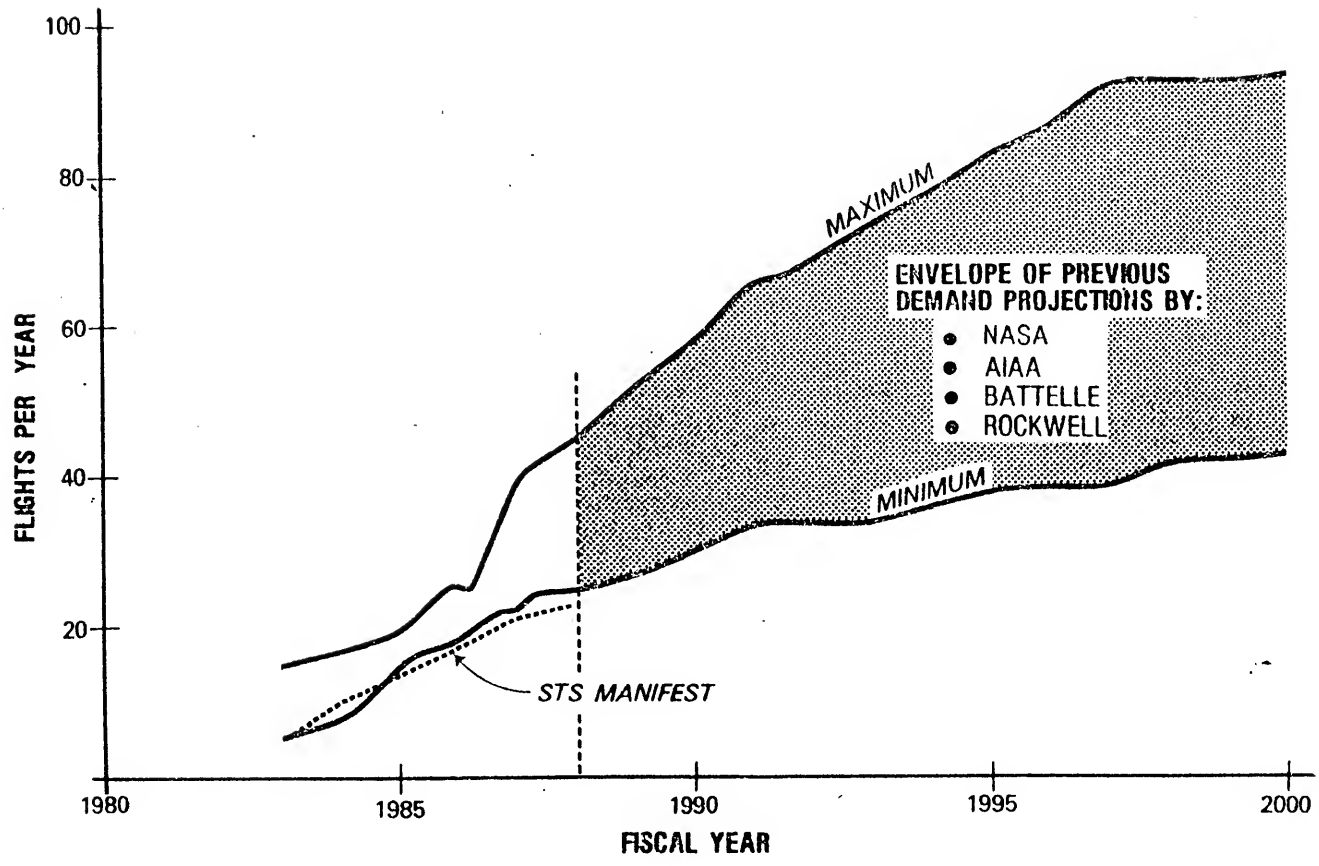
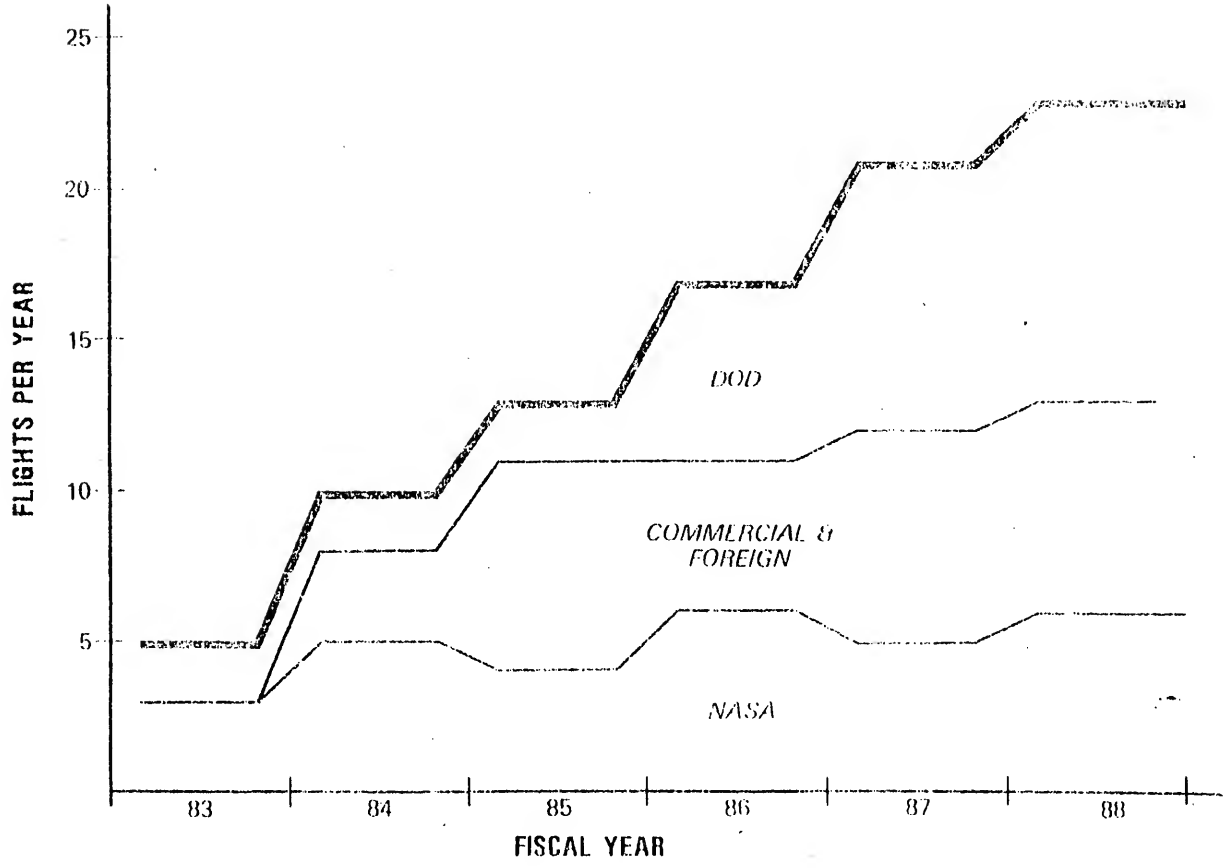
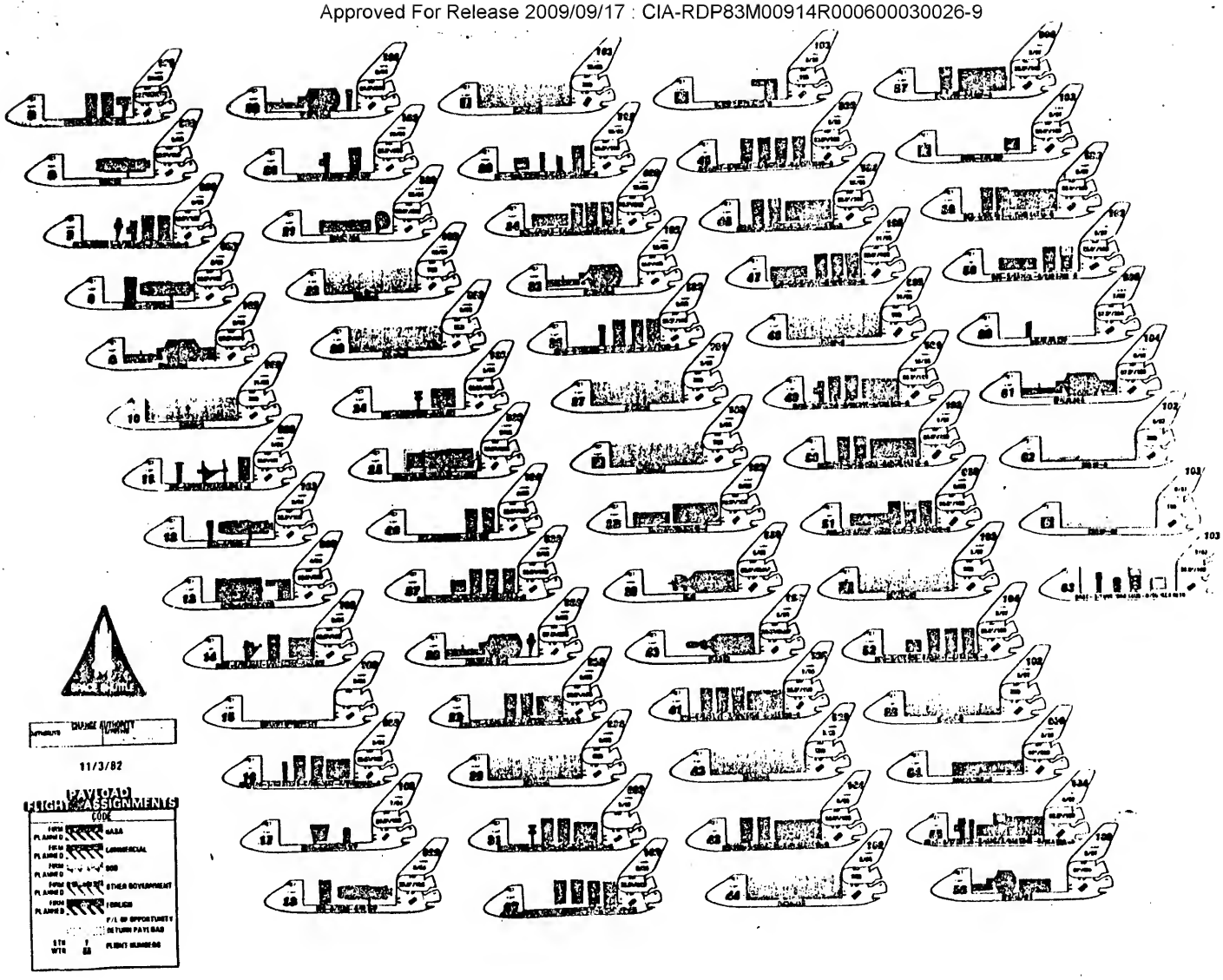
STS DEMAND

PROJECTED STS DEMAND



STS MANIFEST





STS MANIFEST

FY	1983	1984	1985	1986	1987	1988	TOTAL	
NASA	3.00	4.25	3.00	5.50	4.17	5.58	25.50	(29%)
COM'L & FOREIGN	2.00	3.25	5.00	4.25	7.50	4.00	26.00	(29%)
DEPT OF DEFENSE	0.00	2.00	2.33	5.66	9.33	10.33	29.65	(33%)
UNASSIGNED	0.00	0.50	2.67	1.59	0.00	3.09	7.85	(9%)
TOTAL	5.00	10.00	13.00	17.00	21.00	23.00	89.00	

- STS MANIFEST PLANNING BASED ON AN AVERAGE 91 PERCENT LOAD FACTOR.
- ACTUAL CARGO LOADING ANALYSES INDICATE AN AVERAGE 75 PERCENT LOAD FACTOR.
- ADJUSTMENT OF STS MANIFEST TO 75 PERCENT LOAD FACTOR INCREASES THE FLIGHT REQUIREMENT FROM 89 TO 108 TOTAL FLIGHTS.

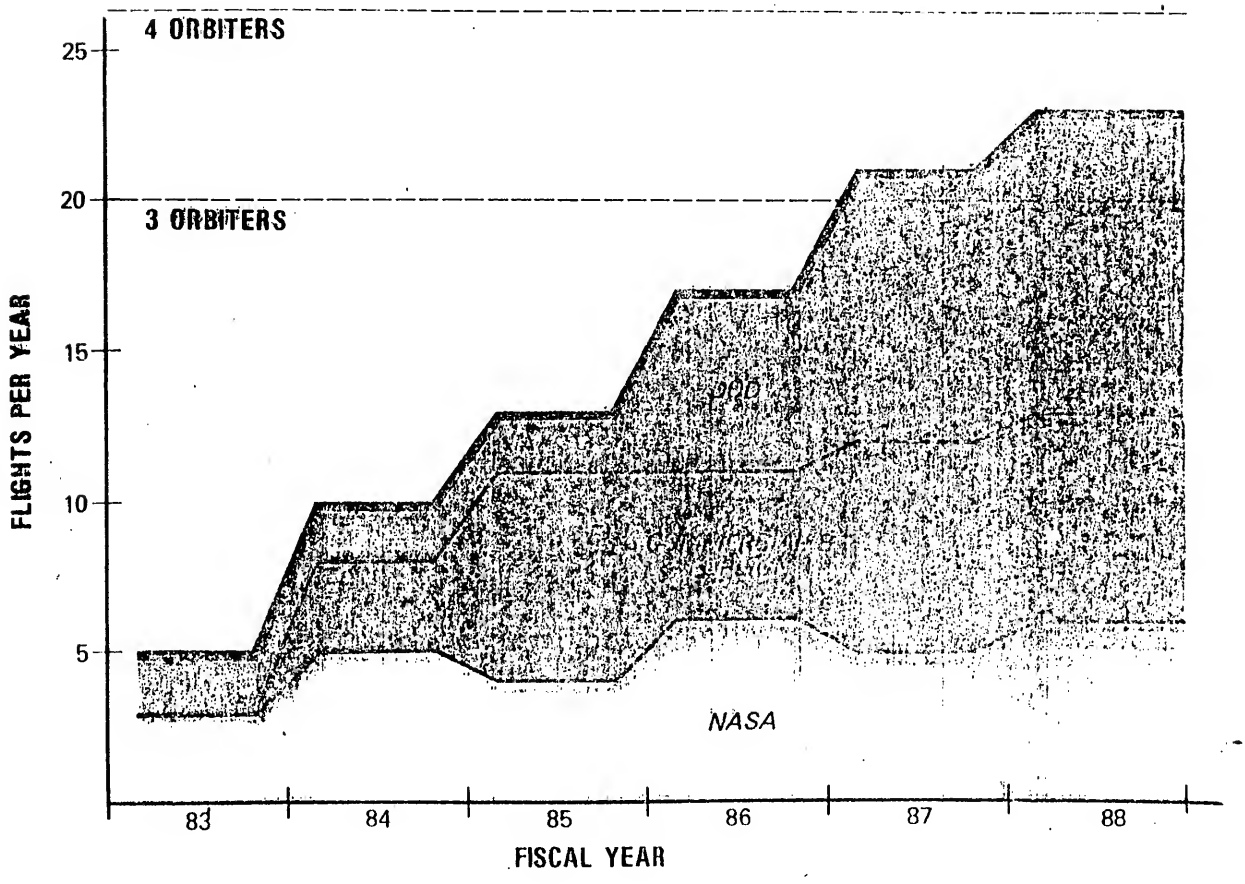
ASSESSMENT OF DEMAND

- PAST DEMAND PROJECTIONS
  - --OPTIMISTIC
- STS MANIFEST (FY83-88)
  - --BEST CURRENT ASSESSMENT
    - NASA BUDGETED PROGRAMS
    - DOD BUDGETED PROGRAMS
    - COMMERCIAL/FOREIGN BOOKINGS
  - --STILL ELEMENTS OF UNCERTAINTY
    - DOUBLE BOOKINGS WITH ARIANE
    - LAUNCH-ON-NEED MISSIONS
    - NEW PROGRAMS
- STS DEMAND POST FY88
  - --ALL ASSESSMENTS PROJECT GROWTH
    - TELECOMMUNICATIONS WORLDWIDE
    - DIRECT BROADCAST WORLDWIDE
    - VIDEO CONFERENCING
    - ELECTRONIC MAIL
    - GEOSYNCHRONOUS PLATFORMS
    - MATERIALS PROCESSING
    - SPACE STATIONS
    - DOD NEW MISSIONS

STS MANIFEST IS REALISTIC DEMAND PLANNING BASE

CAPABILITY VS. DEMAND

STS MANIFEST



ASSESSMENT OF CAPABILITY VS. DEMAND

- FOUR ORBITER FLEET IS MARGINALLY CAPABLE OF MEETING MANIFESTED DEMAND
- THREE ORBITER FLEET CANNOT SATISFY MANIFESTED DEMAND
- NO TOLERANCE FOR:
  - ADVANCED ATTRITION
  - LONGER DURATION MISSIONS
  - SYSTEM OUTAGES FOR MAJOR ANOMALIES/FAILURES OR ACCIDENTS
  - SURGE DEMAND
  - FUTURE GROWTH IN DEMAND

OTHER CONSIDERATIONS

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OTHER CONSIDERATIONS

- AN STS RESERVE CAPACITY:
  - INSTILLS CONFIDENCE IN LAUNCH COMMITMENTS
  - INDUCES DEMAND
  - ENABLES RESPONSE TO NEW NATIONAL INITIATIVE AND FOREIGN CHALLENGES
  - PERMITS CONFIDENCE PHASE-OUT OF U.S. GOVERNMENT ELV'S
  - FACILITATES MANAGEMENT OF UNCERTAINTIES AND RISK
- EXPANDED STS USE IS KEY TO U.S. LEADERSHIP AND PROGRAM SUCCESS
  - LOWERS COST PER FLIGHT FOR ALL CUSTOMERS
  - COMMERCIAL AND FOREIGN REVENUES HELP OFFSET U.S. GOVERNMENT BASE COSTS
  - ACCELERATES CONFIDENCE IN AND COMMITMENT TO SYSTEM
  - ENHANCES U.S. COMPETITIVE EDGE IN RELATED MARKETS
- THERE ARE STILL MAJOR STS PROGRAM UNCERTAINTIES
  - FLEET CAPABILITY
    - REDUCTION IN TURNAROUND
    - MAJOR PERIODIC MAINTENANCE DOWNTIME
    - AVERAGE OPERATIONAL DELAY TIME
    - EFFICIENCIES IN MANIFESTING MIXED CARGO (LOAD FACTOR)
    - IMPACT OF ORBITER CONFIGURATION DIFFERENCES
    - VAFB VS. KSC TURNAROUND AND MISSION CHARACTER
    - PAYLOAD SCHEDULE CONFLICTS
    - ORBITER WEAROUT/REPLACEMENT LIFE CYCLE
    - ATTRITION RATES

OTHER CONSIDERATIONS (CONT'D)

- FLEET DEMAND
  - U.S. GOVERNMENT BUDGET AND NEW INITIATIVES
  - COMMERCIAL AND FOREIGN GROWTH PATTERN
  - FOREIGN ELV COMPETITION

- STS ORBITER PRODUCTION LINE AND SUBCONTRACTOR SUPPORT NOW PHASING DOWN
  - MAJOR SUBCONTRACTOR COMPONENTS DELIVERED BY END OF 1983
  - MAJOR STRUCTURAL ELEMENTS DELIVERED BY MID-1984
  - EROSION AND SHUTDOWN OF PRODUCTION LINE AND SUBCONTRACTORS IS A MAJOR RISK
    - STS IS DOWN IN EARLY 1985
    - ELV'S ARE DOWN IN LATE 1985
  - DELAY OF A FIFTH ORBITER ONE YEAR (FY85 VS. FY84)
    - REQUIRES RESTART AND REQUALIFICATION OF LINE AND SUBCONTRACTORS
    - COSTS AN ADDITIONAL $165M ($1,760 VS. $1,595)

SUMMARY OF OTHER CONSIDERATIONS

- EXPANDED STS USE BENEFITS THE U.S. GOVERNMENT AND ALL USERS
- RESERVE STS CAPACITY INSTILLS CONFIDENCE, INDUCES DEMAND AND IS HEDGE AGAINST UNCERTAINTY AND RISKS
- STILL MAJOR STS PROGRAM UNCERTAINTIES--FLEET CAPABILITY AND DEMAND
- PRODUCTION OF ADDITIONAL ORBITERS AT REASONABLE COST AND LEAD TIME IS ERODING
- ASSESSMENT OF OTHER CONSIDERATIONS

  - AN STS RESERVE CAPABILITY IS ESSENTIAL TO USERS CONFIDENCE AND TO MANAGE PROGRAM UNCERTAINTIES
  - AN ORBITER PRODUCTION CAPABILITY SHOULD BE MAINTAINED UNTIL PROGRAM UNCERTAINTIES ARE RESOLVED

SUMMARY ASSESSMENT

- FOUR ORBITER FLEET CAPACITY OF 26 FLIGHTS PER YEAR IS REALISTIC MAXIMUM
  - NO RESERVE CAPABILITY FOR:
    - SYSTEM OUTAGES
    - LONGER DURATION MISSIONS
    - SURGE DEMANDS
- FOUR ORBITER FLEET IS MARGINALLY CAPABLE OF MEETING THE STS MANIFESTED DEMAND THROUGH FY88
- DEMAND IS EXPECTED TO STEADILY INCREASE BEYOND FY88
- A THREE ORBITER FLEET CANNOT SATISFY THE MANIFESTED DEMAND
- ORBITER PRODUCTION AND SUBCONTRACTOR SUPPORT IS NOW PHASING DOWN

ABILITY TO SATISFY NATIONAL SPACE POLICY
WITH A FOUR ORBITER FLEET CANNOT BE ASSURED

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Attachment 5

Talking Points for SIG(Space) Meeting -

Commercialization of Operational Civil Remote Sensing

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Washington, D.C. 20230

OFFICE OF THE ADMINISTRATOR

NOV 30 1982

TO: Michael J. Bayer
Associate Deputy Secretary of Commerce

FROM: Anthony J. Calio
Deputy Administrator

SUBJECT: Talking Points for SIG(Space) Meeting on December 3, 1982

On Friday, November 26, John McElroy was told by Col. Rye that a SIG(Space) meeting will be held on December 3. He said that two subjects would be discussed: the fifth Space Shuttle orbiter and civil space remote sensing. The fifth orbiter discussion is intended to reach a decision in the meeting, but the remote sensing discussion is only to advise the members of status.

Per your request to John McElroy, the attached chart is provided to give the DOC member an outline of the steps in progress.

Attachment

COMMERCIALIZATION OF OPERATIONAL CIVIL SPACE REMOTE SENSING

Status: December 3, 1982

- CCCT has met a number of times (December 1981, March 1982, April 1982) on the issue of the best approach to commercializing the Landsat and whether the civil weather satellites should be included as well.

- The most recent meeting reached a tentative decision not to include the weather satellites, but elected not to finalize the decision pending receipt and analysis of industry views.

- Industry views were solicited by a notice in the Commerce Business Daily and received on October 22, 1982.

- The views were analyzed by an outside advisory committee and a Government committee.

- The outside committee recommended formal solicitation of firm proposals for industry ownership and/or operation of the land and weather or land (only) satellites. It also recommended against formation of a vertical monopoly in remote sensing. Further, the committee supported submission of an urgent FY 83 supplemental to ensure Landsat data continuity. Principal attention was paid by the committee to the land satellites, rather than the weather satellites.

- The Government committee perceived some national security concerns in commercialization of the land and weather satellites. The evaluation focused on the weather satellites more than the land satellites.

- The CCCT will meet in mid-December to reach a decision on these matters.